**Motivation**

The binary metal sulfides as battery grade electrode materials owing to their intriguing characteristics have brought significant enhancement in electrochemical activities of hybrid energy storage devices. Here, a schematic view presenting synthesis, fabrication of device and electrochemical measurements both in three and two electrode assembly for battery grade metal sulfides have been displayed. To analyze the electrochemical behavior of as synthesized material i.e. SrCuS, electrochemical characterizations including CV, GCD and EIS have been performed. By opting two cell configuration the optimal electrode of SrCuS by virtue of its promising results in three electrode measurements has employed for supercapacitry (hybrid device) application. The superior electrochemical outcomes as revealed, confirmed via Ragone plot and bar diagram extracted through simulation approach to scrutinize the coupling effect of capacitive (AC) and battery grade (SrCuS) electrode materials for hybrid device have next conferred. The designed hybrid device with high energy and power density of 50.28 Wh/kg and 340 W/kg at current density of 0.8 A/g, also retained the cyclic stability of 93.2% for 1000 GCD cycles. All such excellent results demonstrate the worth of as prepared binary metal sulfide for hybrid device applications.

**Results and discussion**

(a, b): Cyclic voltammograms of S1 and S2 (c, d): Charging discharging profiles for S1 and S2 (a - e): Hybrid device electrochemical characterizations (a): CV (b): GCD (c): EIS spectrum (d): Cyclic stability (e): Ragone plot (f): Bar diagram

**Conclusion**

In summary, the binary metal sulfide via advanced technology of sonication is synthesized and employed as an electrode material for hybrid energy storage device (supercapattery). The nanoparticle owing to elevated specific capacity (Q_e) of 596.48 C/g and capacitance of 852.13 F/g at potential sweep rate of 3 mV/s has been employed as positive electrode alongwith activated carbon that has treated as negative electrode material for device fabrication. The hybrid device on electrochemical characterizations incorporating CV, GCD and EIS depicted fascinating electrochemical outcomes. With high Q_e of 217.2 C/g the device demonstrated superior energy density of 51.28 Wh/kg at 0.7 A/g. Moreover, corresponding to the high current density of 8 A/g the device procured the maximum power density of 6800 W/kg while sustaining the capacity retention of 90.3% for 1000 GCD cycles. The Dunn’s model is next employed to evaluate the capacitive and diffusive contribution. In this regard the device divulged the capacitive and diffusive contribution of 32.48% and 67.52% at scan rate of 100 mV/s respectively. These excellent outcomes explicitly recommend the binary metal sulfide as promising contender for potential hybrid storage and conversion devices.